



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/774,454

02/10/2004

Takao Saito

811\_106

9153

25191

7590

06/16/2009

BURR & BROWN

PO BOX 7068

SYRACUSE, NY 13261-7068

EXAMINER

TUROCZY, DAVID P

ART UNIT

PAPER NUMBER

1792

MAIL DATE

DELIVERY MODE

06/16/2009

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/774,454	<b>Applicant(s)</b> SAITO ET AL.	
	<b>Examiner</b> DAVID TUROCY	<b>Art Unit</b> 1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☐ Responsive to communication(s) filed on 15 April 2009.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-3,5 and 7-9 is/are pending in the application.
- 4a) Of the above claim(s) 5 and 7 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☐ Claim(s) 1-3,8 and 9 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 4/15/09 has been entered.

### ***Response to Amendment***

2. The declaration under 37 CFR 1.132 filed 2/17/2009 is insufficient to overcome the rejection of claims based upon the prior art references of record as set forth in the last Office action because:

a. The statements made within the declaration are merely allegations that are unsupported by any factual evidence. Specifically, the applicant's allegations regarding the Raman Spectrum of Yara are not commensurate in scope with the entire teaching of Yara, where the declaration limits the teaching to the pulse duration of 20 ms, versus the range as claimed. Specifically, one of ordinary skill in the art would deem 1000 nanoseconds (as taught by Yara) to have similar properties to that with a 999.99 nanosecond pulse duration and there is no showing of fact that rebuts this position.

- b. The arguments set forth in paragraph 8 and 9, regarding the unpredictability of the pressure and pulse duration is not supported by any facts and are only allegations that are deemed opinions.
  - c. In regards to the arguments regarding the Yara reference teaching that a plasma is unstable below 1000 ns, the examiner notes this statement of Yara, however, the Yara reference and the presently claimed invention discloses all the same process steps and therefore it is unclear what process steps the applicant is achieving to arrive at a stable plasma as alleged.
  - d. The showing with regards to the combination of Mizuno and Yara is unpersuasive because the declaration narrowly interprets the Mizuno reference to be limited to vacuum technology and the examiner can not locate any disclosure of such in the reference. While the reference exemplified vacuum, the claims are open to 100 Torr and the examiner can not locate any disclosure in the reference that limits its overall teachings of control of plasma using a pulse duration is limited to vacuum technology as alleged.
  - e. The statement that the declarant would not have a reason to combine is deemed unpersuasive because this is deemed mere opinion not supported by any factual evidence that supports this position.
3. Applicant's amendments filed 4/15/09, have been fully considered and reviewed by the examiner. The examiner notes the addition of new claim 9. Claims 1-3, and 5, 7-9 remain pending with claims 5 and 7 withdrawn due to a restriction requirement.

***Response to Arguments***

4. Applicant's arguments filed 4/15/09 have been fully considered but they are not persuasive.

The applicant has argued against the Yara reference stating that the reference discloses a different DLC film because the reference discloses a mean peak at  $1332\text{ cm}^{-1}$ . Again the examiner disagrees. The applicant argue that by doing 999 ns pulses a distinct film will be formed versus using 1000 ns pulse. However, this is not persuasive and the applicant has not provided any factual evidence to support the position. Specifically, Yara discloses each and every step in the process as claimed, the reference discloses the same precursor gases, the same reactive environment, the same pressures, pulsing a voltage, etc. as claimed and/or disclosed by the applicant. Again the examiner maintains that the results, i.e. the Raman spectrum of the deposited film, of Yara, must necessarily be the same as those claimed by the applicant, unless there are other process steps that are not claimed which are necessary to achieve the desired results.

The applicant argue that the actual data provided by Yara is for 20 ms (sic) pulse durations and thus pulse duration of the lower limit of Yara is merely speculative. However, this is clearly mere attorney speculation that is not supported by any factual evidence and thus must be deemed moot. The mere fact that Yara discloses an example does not limit the entire teaching of the reference to the discloses embodiment.

Yara clearly discloses 1000 ns pulses and thus such is within the teaching of the reference.

The applicant argues that the prior art teaches away from using the pulse duration of less than 1000 ns. While the examiner agrees that Yara states that if the pulse duration is less than 1000 ns "the discharge becomes unstable." However, the examiner maintains the position that one of ordinary skill in the art would reasonable expect 999 ns pulse duration to have effectively similar discharge stability as that of 1000 ns. The applicant appears to argue that the use of 999 ns provides unexpected results or has some unexpected benefit to that of 1000 ns, however, the examiner notes that no factual evidence as been provided to rebut the examiners position. Additionally, the examiner notes that Mizuno discloses pulsing the discharge at ultrashort pulses provides an method to achieve active control of a plasma. Mizuno discloses using a high voltage in combination with pulses of 50-1000 ns duration without any plasma non-uniformity or arcing because voltage amplitude falls to zero before glow to arc transition (abstract). Therefore, taking the references collectively, it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified Yara by providing high voltage pulses of 50 - 1000 ns as suggested by Mizuno to reap the benefits of providing active control. Please note that the test of obviousness is not an express suggestion of the claimed invention in any or all references, but rather what the references taken collectively would suggest to those of ordinary skill in the art presumed to be familiar with them (*In re Rosselet*, 146 USPQ 183). So for the differences in pressure, Mizuno discloses that such, in combination with the pulse duration, is a result

effective variable and it is within the skill of one of ordinary skill in the art to optimize such with a reasonable expectation of depositing a film using a plasma (introduction).

Additionally, the claim would have been obvious because the technique for improving particular methods was part of the ordinary capabilities of a person of ordinary skill in the art, in view of the teaching of the technique for improvement in other situations. See *KSR Int'l Inc. v. Teleflex Inc.*, 127 S Ct. 1727, 1741, 82 USPQ2d 1385, 1396 (2007). Specifically, Yara states that if the pulse duration is less than 1000 ns "the discharge becomes unstable", and Mizuno discloses a improving a pulse plasma includes reducing the pulse duration to achieve active control over the plasma.

The applicants argue that the claims going against the express teaching of Yara is evidence in of itself of patentability and nonobviousness and that such discloses that the 1000 ns as taught by Yara is mere speculative. However, the examiner disagrees. The mere exemplary showing of Yara does not limit the teaching of the reference to only the pulse duration that is exemplified. The applicant has failed to provide any factual evidence to support the position that Yara is limited to a single disclosed embodiment and thus such an argument is mere attorney speculation and must be deemed moot.

The applicant argues against the combination of Yara and Mizuno stating that one of ordinary skill in the art would not have a reason to combine the teachings, however, the examiner disagrees because Mizuno discloses more active control over the plasma using shorter pulses. Also the examiner notes that Mizuno discloses that

controlling a plasma, using power, frequency, chamber pressure, are well within the skill of one ordinary skill in the art.

All other applicants' arguments not specifically addressed above are unsupported by any factual evidence and thus are deemed mere attorney speculation and thus are deemed moot. It is well settled that arguments of counsel unsupported by competent factual evidence of record are entitled to little weight. *In re Payne*, 606 F.2d 303,315, 203 USPQ 245,256 (CCPA 1979).

### ***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1-3 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 11-12735 by Yara et al, hereinafter Yara alone or further in view of "Deposition of thick diamond films by pulsed d.c. glow discharge CVD" By Hartmann et al. or "DLC films formed by hybrid pulse plasma coating (HPPC) System" by Awazu et al.

Claim 1: Yara discloses a method of producing a thin film using opposing electrodes by applying a pulse voltage to opposing electrodes under a pressure within the claimed range and under an atmosphere comprising a gaseous raw material including a carbon source to generate discharge plasma so that a thin film is formed on a substrate. (see for example abstract, paragraphs 0008-0013, figures). The pulse has



a duration 1000 nanoseconds (0011). A *prima facie* case of obviousness exists where the claimed ranges and prior art do not overlap but are close enough that one in ordinary skill in the art would have expected them to have the same properties.

*Titanium Metals Corp. of America v. Banner*, 778 f.2d 775, 227 USPQ 773 (Fed. Cir. 1985). See MPEP 2144.05. Specifically, one of ordinary skill in the art would deem 1000 nanoseconds to have similar properties to that with a 999 nanosecond pulse duration.

As for the requirement of Raman spectrum. The examiner notes the film deposited by Yara is diamond like carbon (0013), and the process as taught by Yara disclose the pulsed plasma deposition and the prior art and the present claims, reflected by claim 1, teach all the same process steps and thus the results obtained by applicants process must necessarily be the same as those obtained by the prior art. Therefore by pulsed plasma process, it must necessarily result in the claimed Raman spectrum. Either 1) the applicant and the prior art have different definitions for DLC films, or 2) the applicant is using other process steps or parameters that are not shown in the claims. Specifically, it is the examiners position that a DLC film deposited at 999 ns pulses will necessarily have the same Raman spectrum as that deposited at 1000 ns.

Yara discloses depositing a DLC coating layer by pulse deposition and discloses a Raman spectrum peak at  $1332\text{ cm}^{-1}$ , however, fails to explicitly discloses a broad peak at about  $1580\text{ cm}^{-1}$  and a shoulder peak between 1300-1500 as required by the claim. However, Hartmann and Awazu disclose the Raman spectrum of deposited films. Hartmann discloses a DLC films are measured using Raman spectrum, including

a diamond peak at  $1332\text{ cm}^{-1}$  and a broader peak at  $1550\text{ cm}^{-1}$  (which can be considered about  $1580\text{ cm}^{-1}$  as required by the claim) (Figure 4 (d), page 854). Additionally, Hartmann discloses the DLC Raman spectrum is adjusted by varying the gas phase concentrations (page 854). Additionally, Awazu discloses DLC films deposited have a broad peak around  $1590\text{ cm}^{-1}$  and a peak around  $1360\text{ cm}^{-1}$  (page 173). Additionally, Awazu, at figure 3 and 4, discloses such Raman spectrum for a deposited DLC film using a plasma includes the peaks as claimed by the applicant and discloses adjusting the gas flows to achieve the desired Raman spectrum (175).

Therefore, the evidence suggests that the process of Yang, which deposits a DLC layer, must have a similar Raman spectrum as taught by Hartman and Awazu as associated with DLC deposited layers, that is a diamond peak at  $1332\text{ cm}^{-1}$  (that addressed in the disclosure of Yara) accompanied by a broader peak at  $1550\text{ cm}^{-1}$  or  $1590\text{ cm}^{-1}$  (which can be considered about  $1580\text{ cm}^{-1}$  as required by the claim).

At the very least, Harmann and Awazu disclose known and suitable Raman spectrums for deposited DLC layers and both disclose adjusting the ratio of the gases to deposit the DLC with the desired Raman Spectrum. Therefore, taking the references collectively, it would have been obvious to one of ordinary skill in the art to have adjusted the process parameters in the process of Yang to achieve the predictable and desired Raman spectrum. A predictable use of prior art elements according to their established functions to achieve a predictable result is prima facie obvious. See *KSR Int'l Inc. v. Teleflex Inc.*, 127 S Ct. 1727, 1741, 82 USPQ2d 1385, 1396 (2007).

Claim 2. The pulse voltage of Yara has a pulse rise time of 1000 nsec or shorter (0010).

Claim 3. The pulse voltage of Yara has a pulse fall time of 1000 nsec or shorter (0010).

Claim 9: Yara discloses including gases from the VIII group of the periodic table (0041).

7. Claims 1-3 and 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 11-12735 by Yara et al, hereinafter Yara and further in view of "Characterization of Ultra-Short pulsed Discharge Plasma for CVD processing" by Mizuno, hereafter Mizuno.

Yara is applied here for the all the same reasons as set forth above and the examiner maintains the position as set forth above. However, Mizuno discloses that in order to achieve an active control of plasma using pulse duration of less than 1 ms (1000 ns). Mizuno discloses that such active control of the plasma structure in space and time allows for optimum reaction filed and controlling the ions and radicals life time. (page 656). Mizuno discloses using a high voltage in combination with pulses of 50-1000 ns duration without any plasma non-uniformity or arcing because voltage amplitude falls to zero before glow to arc transition (abstract).

Therefore, taking the references collectively, it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified Yara by providing high voltage pulses of 50 - 1000 ns as suggested by Mizuno to reap the benefits of

providing active control. Please note that the test of obviousness is not an express suggestion of the claimed invention in any or all references, but rather what the references taken collectively would suggest to those of ordinary skill in the art presumed to be familiar with them (*In re Rosselet*, 146 USPQ 183).

Additionally, the claim would have been obvious because the technique for improving particular methods was part of the ordinary capabilities of a person of ordinary skill in the art, in view of the teaching of the technique for improvement in other situations. See *KSR Int'l Inc. v. Teleflex Inc.*, 127 S Ct. 1727, 1741, 82 USPQ2d 1385, 1396 (2007).

As for the requirement of Raman spectrum. The examiner notes the film deposited by Yara is diamond like carbon (0013), and the process as taught by Yara in view of Mizuno disclose the pulsed plasma deposition with pulses in the range as claimed. Therefore, since the prior art and the present claims, reflected by claim 1, teach all the same process steps, the results obtained by applicants process must necessarily be the same as those obtained by the prior art. Therefore by pulsed plasma process, it must necessarily result in the claimed Raman spectrum. Either 1) the applicant and the prior art have different definitions for DLC films, or 2) the applicant is using other process steps or parameters that are not shown in the claims.

Claim 9: Yara discloses including gases from the VIII group of the periodic table (0041).

### ***Conclusion***

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to DAVID TUROCY whose telephone number is (571)272-2940. The examiner can normally be reached on Monday-Friday 8:30-6:00, No 2nd Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/David Turocy/  
Patent Examiner, Art Unit 1792

/Timothy H Meeks/

Application/Control Number: 10/774,454  
Art Unit: 1792

Page 13

Supervisory Patent Examiner, Art Unit 1792